RELATIONSHIP OF SMALL WASHES TO THE DISTRIBUTION OF *LYCIUM ANDERSONII* AND *LARREA TRIDENTATA* AT A SITE IN THE NORTHERN MOJAVE DESERT

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Abstract.— At a site near Rock Valley, Nevada, dominated by volcanic rocks, both *Larrea tridentata* (Sesse & Moc. ex DC.) Cov. and *Lycium andersonii* A. Gray were restricted in distribution. *Larrea tridentata* did not grow in the many small washes in the area, but *L. andersonii* grew only in the washes. *Ambrosia dumosa* (A. Gray) Payne was more dense and more dominant in wash areas than in nonwash areas.

The vegetation mosaic of the Rock Valley area of the northern Mojave Desert has a high degree of variability and changes considerably from site to site (Beatley 1976, Romney et al. 1973, Turner and McBrayer 1974, Turner 1975, 1976). The dominant species are *Larrea tridentata* (Sesse & Moc. ex DC.) Cov., *Ambrosia dumosa* (A. Gray) Payne, and *Lycium andersonii* A. Gray on some sites and *L. tridentata*, *Lycium pallidum* Miers, and *Grayia spinosa* (Hook.) Moq. on others. *Ambrosia dumosa* and *L. pallidum* are of lesser importance on these latter sites. The study was made because of the impression that the small washes in the area were free of *L. tridentata* and that *L. andersonii* grew only in the washes. In other studies conducted here, *L. tridentata* and *L. andersonii* have been highly associated, whereas, *L. tridentata* and *L. pallidum* tend to be negatively associated (Romney and Wallace 1980, Wallace and Romney 1972).

Materials and Methods

The study site was located off Road 40 near the east entrance to Rock Valley at the Nevada Test Site. It is near Site No. 58 of the soils-plant study made by Romney et al. (1973). The area is above the main part of the valley and near Skull Mountain (Beatley 1976). It has a slope of 2 percent to the south and the area is crossed by many small washes, often 10 to 15 m apart.

Two belt transects, each 50 m × 2 m, were sampled in both the wash and nonwash areas. An inventory was made of all plants falling more than 50 percent in the transect in order to determine numbers and relative dominance (Wallace and Romney 1972).

Mineral analyses were made of the plants to determine if the location differences could be explained by variations in nutrient element distribution.

Results and Discussion

The numbers and relative dominance of plant species are reported in Table 1. The high species diversity seen elsewhere in Rock Valley (Beatley 1976, Romney et al. 1973) is apparent. No *L. tridentata* were observed in the transects in the washes and no *L. andersonii* were observed in the transects in the nonwash areas. The density of *L. pallidum* was not different in and out of washes. There were more total plants (greater density) in the wash than out of the wash area, primarily due to variations in the density of *A. dumosa*.

Four possible reasons for the vegetation pattern differences are (1) more water in the washes, (2) different soil texture in the washes, (3) soluble salts had been leached out along the washes, and (4) positive effect of

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the wash on the seed germination of the *L. andersonii.* No seedlings of any of the species were observed either in or out of the washes when sampled in 1976. Soil texture is sandy (Beatley 1976, Romney et al. 1973, Wallace and Romney 1972).

A question of most interest was the salt status of the plants, but the mineral element contents generally did not vary significantly between locations. Some of the mineral analyses are in Table 2. *Lycium pallidum* is known to be more adapted to salt than is *L. andersonii* (Beatley 1976, Romney et al. 1973, Wallace et al. 1973). *Lycium pallidum* is not an obligate halophyte and this may account for its being equally distributed in wash and nonwash areas. The chlorine concentration in *L. pallidum* and *G. spinosa* varied inversely in and out of washes (3.68 percent and 2.73 percent in and out of washes for *L. pallidum* and 1.84 percent and 2.02 percent in and out of washes for *G. spinosa*).

An attempt was made in 1976 to determine differential leaf water potentials in plants in and out of washes as determined with a Scholander bomb (Scholander et al. 1965). Results were inconclusive. Leafwater potentials of the species involved were reported earlier (Wallace and Kleinkopf 1974). Given repeated and prolonged measurements in different types of rainfall years, this technique probably could yield important information on the problem of differential plant distribution.

Acknowledgments

This study was supported by Contract EY-76-C-03-0012 between the U.S. Department of Energy and the University of California.

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Table 1. Numbers of shrubs and their relative dominance in wash and nonwash areas°.

	Wash 1		Wash 2		Hill 1		Hill 2	
Species	No.	Rel. dom.	No.	Rel. dom.	No.	Rel. dom.	No.	Rel. dom.
Psorothamnus fremontii	1	0.4	3	0.8	2	3.1	7	5.1
Ephedra nevadensis	1	2.1	0	0.0	0	0.0	0	0.0
Ceratoides lanata	1	0.1	0	0.0	0	0.0	5	1.5
Ambrosia dumosa	57	30.4	72	27.6	40	14.0	29	9.6
Grayia spinosa	34	39.2	33	50.6	29	37.0	31	39.5
Hymenoclea salsola	1	0.9	0	0.0	0	0.0	1	0.6
Larrea tridentata	0	0.0	0	0.0	10	24.0	4	16.7
Lycium andersonii	5	5.6	4	4.7	0	0.0	0	0.0
Lycium pallidum	15	18.6	10	15.8	16	21.7	16	26.9
Tetradymia axillaris	2	2.3	0	0.0	0	0.0	0	0.0
Machaeranthera tortifolia	2	0.4	3	0.4	1	0.2	1	0.1
Oryzopsis hymenoides	0	0.0	3	0.1	0	0.0	0	0.0
	119	100.0	128	100.0	98	100.0	94	100.0

°Relative dominance is calculated as: $\frac{\text{Total basal area of species}}{\text{Total basal area all species}} \times 100$.

TABLE 2. Mineral composition of leaves of plants in and out of washes.

Species and location	P %	Na %	K %	Ca %	Mg %	Cu μg/g
Lycium pallidum						
In wash—mean	0.288	0.954	4.393	3.643	1.312	6.6
Out of wash—mean	0.250	1.193	3.955	4.497	1.275	4.5
In wash vs. out of wash F value	2.529	0.424	1.917	8.606	0.167	3.85
Lycium andersonii						
All in wash—mean	0.232	0.0269	3.650	10.695	1.111	3.5
F value between species	93.76	22.50	3.68	8.46	16.01	14.68
Grayia spinosa						
In wash—mean	0.248	0.0497	7.711	2.440	1.462	4.0
Out of wash—mean	0.312	0.0667	8.618	2.231	1.351	3.4
In wash vs. out of wash F value	0.582	1.030	0.829	0.406	0.985	1.148

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Table 2 continued.

Fe µg/g	Mn µg/g	B µg/g	Al µg/g	Si µg/g	Mo µg/g	Sr µg/g	Ba µg/g	Li µg/g
296	63.3	33.5	271	1056	2.4	426	23.3	25.4
259	55.4	38.2	231	954	2.1	414	19.8	34.6
2.364	1.774	1.339	0.862	0.927	0.575	0.133	3.386	0.413
311	48.9	28.3	299	958	1.6	751	48.7	56.6
6.76	26.65	23.01	8.87	5.99	146.0	5.41	15.98	93.3
342	250	44.1	463	1529	1.0	268	28.2	–
327	202	36.4	378	1416	1.2	213	22.3	–
0.729	0.830	4.218	2.318	0.478	1.810	1.865	6.399	–